REMARKS/ARGUMENTS

Claims 1 and 3-19 are pending in the application. Claim 2 has been cancelled, and the limitations thereof have been incorporated into Claim 1. Therefore, the anti-cavitation additive of Claim 1 and all claims dependent thereon comprises a copolymer having an average molecular weight Mw ranging from 700 to 3000. Support is found in the Specification at pages 5-6, bridging ¶. The amounts of 30 ppm to 3 % by weight per total weight of the emulsion of anti-cavitation additive in currently amended Claim 1 and 50 ppm to 1.5 % by weight per total weight of the emulsion of anti-cavitation additive in new Claim 19 are found in the Specification at page 12, lines 6-11. The definition of the copolymer of currently amended Claim 1 as having been prepared by copolymerizing 20-80% in moles of an ethylenically unsaturated carboxylic acid monomer containing at least one carboxylic acid group and 80-20% in moles of at least one other ethylenically unsaturated monomer is found in the Specification at page 6, line 24, to page 7, line 24. The provision of currently amended Claim 1 that at least 20% in moles of the carboxylic acid groups in the copolymer is in the form of at least one derivative selected from the group consisting of carboxylate salt, ester, amide and imide derivatives of the carboxylic acid groups is found in the Specification a page 5, line 20, to page 6, line 23. Current amendments to Claims 3-13 and 15-18 eliminate all multiple dependencies and define % by weight of the components as % by weight per total weight of the emulsion. Support therefore is found in the Specification at pages 8, lines 17-25; page 9, lines 5-11; page 12, lines 6 to 11; and page 13, lines 3-12. No new matter has been added.

Rejection of Claims 1-6 under 35 U.S.C. § 103(a) in view of Westfall

Claims 1-6 stand rejected under 35 U.S.C. § 103(a) in view of Westfall (Westfall et al., US 2002/0116868, published August 29, 2002). Applicant's claims are currently amended not only to specify the amount of the anti-cavitation additive but also to further

define the anti-cavitation additive as comprising a copolymer prepared by copolymerizing 20-80% in moles of an ethylenically unsaturated carboxylic acid monomer containing at least one carboxylic acid group and 80-20% in moles of at least one other ethylenically unsaturated monomer, wherein (1) at least 20% in moles of the carboxylic acid groups in the copolymer is in the form of at least one derivative selected from the group consisting of carboxylate salt, ester, amide and imide derivatives of the carboxylic acid groups, and (2) the copolymer has an average molecular weight Mw ranging from 700 to 3000. Applicant believes that a fair comparison of the composition, properties, and function of the anti-cavitation additive utilized in the claimed water-in-oil fuel emulsion to the composition, properties, and function of the emulsifiers utilized in the aqueous hydrocarbon fuel emulsions Westfall describes will show that persons having ordinary skill in the art reasonably would not have understood that Applicant's anti-cavitation additives are described or reasonably suggested by Westfall for use in stabilizing aqueous hydrocarbon fuel emulsions.

Westfall is not concerned with "cavitation" problems associated with fuels which are water-in-oil emulsions. Applicant's Specification teaches (Spec., p. 4, l. 20, to p. 5., l. 7):

> The Applicants believe that the cavitation phenomena described . . . can become particularly significant with the use of fuels in the form of aqueous emulsion. These fuels, in fact, have a heterogeneous structure in which the conditions of the aqueous phase, that has a surface tension higher than that of the hydrocarbon, are more favorable for forming cavities.
>
> The Applicant's consequently considered the problem of reducing the risk . . . of cavitation in internal combustion engines fed with fuels in the form of aqueous emulsion, without jeopardizing the stability of the emulsion itself . . . .

Applicant teaches that both the problem of forming cavities in water-in-oil fuel lines and the solution to the problem involve are related to the higher surface tension of the aqueous phase of the emulsion relative to that of the hydrocarbon phase of the emulsion.

Westfall, on the other hand, appears to be concerned exclusively with producing stable aqueous hydrocarbon fuel emulsions [0002]. According to Westfall, the key to

preparing aqueous hydrocarbon fuel emulsions having good stability is the kinds of emulsifiers one employs to emulsify the water in the hydrocarbon. The level of surface tension of the aqueous phase relative to that of the hydrocarbon appears to be immaterial to Westfall's purpose.

Applicant's water-in-oil fuels also contain emulsion-stabilizing emulsifiers. Some of Applicant's choice emulsifies appear to be the same or substantially the same as those Westfall describes. See Applicant's Specification at page 9, line 1, to page 12, line 5. Applicant teaches that the "stability of the emulsion . . . is not substantially jeopardized by the anti-cavitation agent" (Spec., p. 12, ll. 6-11) at least in part because the anti-cavitation additive added to the emulsion is "soluble in the emulsion" (Spec., p. 12, ll. 6-11).

Applicant has not been able to fully comprehend the basis in Westfall's disclosure for the Examiner's rejection. The pertinence of the Examiner's findings to the fuel Applicant currently claims is unclear. The Examiner finds that Westfall teaches a fuel Applicant claims, including an "anti-cavitation additive, including a copolymer comprising units containing at least one carboxylic group and units deriving from at least one monomer having an ethylene unsaturation . . . wherein at least part of the carboxylic groups is in the form of one derivative such as a salt" (Office Action (OA), dated October 16, 2008, p. 3, first para.). The Examiner cited Westfall [0125-0133 and claims 1-6] in support of that finding. *Id.* Next, the Examiner finds that the 20-80 % ranges for Applicant's co-monomers "are implicit" and generally concludes that the selected components are "obvious" (OA, p. 3).

With respect to Applicant's previously presented Claim 2, now incorporated into currently presented Claim 1, the Examiner finds that Westfall "teaches hydrocarbyl substituents of these acylating agents have number average molecular weights of about 700 to about 3000 [0110]" (OA, p. 3). However, the Examiner has not explained the relevance of that finding to the specific subject matter Applicant currently claims. For Applicant's

previously presented Claims 3 and 4, the Examiner finds that Westfall teaches ammonium salts in combination with emulsifiers (i), (ii), (iii), (v) and (vii)(OA, p. 3). Again, the relevance of the Examiner's finding to the subject matter Applicant currently claims is unclear. For Applicant's previously presented Claim 5, the Examiner cites Westfall [0109] without explaining the pertinence of the teaching (OA, p. 3). For Applicant's previously presented Claim 6, the Examiner cites Westfall [0113] again without explaining the pertinence of the teaching (OA, p. 3). Applicant does not deny that Westfall generally teaches some of what the Examiner finds that it teaches. However, the relevance of the Examiner's findings escapes this Applicant and would have escaped persons having ordinary skill in the art.

Westfall teaches one embodiment of its aqueous hydrocarbon fuel emulsion including emulsifier (i) which is a hydrocarbon fuel-soluble product "made by reacting at least one hydrocarbyl-substituted carboxylic acid acylating agent with ammonia or an amine" [0109]. One hydrocarbyl substituent of said acylating agent is said to have about 50 to about 500 carbon atoms [0109] and a number average molecular weight ranging from 700 to 3000 [0110]. Emulsifier (i) may be a hydrocarbyl-substituted carboxylic acid acylating agent which is made by "reacting one or more alpha-beta olefinically unsaturated carboxylic acid reagents containing 2 to about 20 carbon atoms, exclusive of the carboxyl groups, with one or more olefin polymers" [0111]. One specific embodiment is a polyisobutylene-substituted succinic anhydride wherein the polyisobutylene substituent has a number average molecular weight of about 700 to about 3,000 [0112].

The Examiner will recognize that emulsifier (i) is a reaction product of a polyolefin having an average molecular weight of 700 to 3,000, and an ethylenically unsaturated carboxylic acid. The resultant polymers have hydrocarbyl sequences which alone have an average molecular weight of 700 to 3000. Persons having ordinary skill in the art reasonably

would have understood that the average molecular weight of the reaction products of a hydrocarbyl sequence which itself has an average molecular weight of 700 to 3000 and 20 % to 80 % in moles of olefinically unsaturated carboxylic acid monomers, and the still further reaction products thereof with amines, must have an average molecular weight significantly higher than the 700 to 3000 average molecular weight attributed to the hydrocarbyl substituent itself. Moreover, an emulsifier (i) with a hydrocarbyl substituent having an average molecular weight very much higher than the 700 to 3000 cannot be prepared by copolymerizing 20-80% in moles of an ethylenically unsaturated carboxylic acid monomer containing at least one carboxylic acid group and 80-20% in moles of at least one other ethylenically unsaturated monomer and reacting at least 20% in moles of the carboxylic acid groups in the prepared copolymer with an amine. Westfall's emulsifier (i) appears to comprise polyolefin hydrocarbyl substituents having an average molecular weight of 700 to 3000 in order to improve the solubility of the emulsifier in the hydrocarbon fuel phase of its aqueous hydrocarbon fuel emulsion. Westfall's emulsifier (i) was never designed to reduce the surface tension of the aqueous phase of Westfall's aqueous hydrocarbon fuel emulsion. Westfall's emulsifiers are designed to stabilize aqueous hydrocarbon fuel emulsions. Westfall's emulsifiers are not anti-cavitation additives as defined in Applicant's currently amended claims.

Westfall teaches another embodiment of its aqueous hydrocarbon fuel emulsion including an emulsifier (v) which is "the reaction product of A) a polyacidic polymer, B) at least one fuel soluble product made by reacting at least one hydrocarbyl-substituted carboxylic acid acylating agent, and C) a hydroxyl amine and/or a polyamine" [0126]. Examples of polyacidic polymers include alpha-olefin/maleic anhydride copolymers [0128], maleic anhydride/styrene copolymers, poly-maleic anhydride, acrylic and methacrylic acid containing polymers, polyacrylates [0129-0132]. An example of a fuel soluble product made

by reacting at least one hydrocarbyl-substituted carboxylic acid acylating agent and a hydroxyl amine and/or a polyamine with a polyacidic polymer [0127] is "a polyalkenyl succinimide crosslinked with an olefin/maleic anhydride copolymer [0133].

While Westfall's emulsifier (v) resembles the anti-cavitation copolymer additive of Applicant's Claim 1 somewhat, it is important for the Examiner to recognize that Westfall's pre-reacted fuel soluble products are hydrocarbon fuel-soluble products "made by reacting at least one hydrocarbyl-substituted carboxylic acid acylating agent with ammonia or an amine" [0109]. The hydrocarbyl substituent of the hydrocarbyl-substituted carboxylic acid acylating agent reactant used to prepare Westfall's emulsifier (v) itself has about 50 to about 500 carbon atoms [0109] and a number average molecular weight ranging from 700 to 3000 [0110]. It is that hydrocarbyl-substituted carboxylic acid acylating agent which Westfall first reacts with an hydroxyl amine and/or a polyamine [0126] and then reacts with a polyacidic polymer to prepare emulsifier (v).

Persons having ordinary skill in the art reasonably would have understood that Westfall's reaction product of the hydrocarbyl-substituted carboxylic acid acylating agent which Westfall first reacts with a hydroxyl amine and/or a polyamine will react with every available carboxylic acid group in Westfall's polyacidic polymer coreactant to form emulsifier (v). Thus, every carboxylic acid group in Westfall's polyacidic polymer co-reactant should be an ester or an amide of a hydrocarbyl-substituted carboxylic acid acylating agent having a minimum average molecular weight of 700 to 3000. As the Examiner will recognize, the average molecular weight of Westfall's emulsifier (v) far exceeds the average molecular weight of 700 to 3000 specified for the anti-cavitation copolymer component of the fuel defined by Applicant's current claims.

On a closer reading and comparison of Applicant's Specification and Westfall's disclosure, the Examiner will recognize that Westfall's emulsifiers are not designed to

eliminate the "cavitation" problems the art faced or reduce the higher surface tension of the aqueous phase of aqueous hydrocarbon fuel emulsions. Westfall's emulsifiers differ significantly from Applicant's anti-cavitation copolymers in chemical structure and average molecular weight. Westfall's emulsifiers are designed to stabilize aqueous hydrocarbon fuel emulsions. Applicant's invention is designed to reduce the "cavitation" problem associated with aqueous hydrocarbon fuel emulsions without jeopardizing the stability of the aqueous hydrocarbon fuel emulsion (Spec., p 5, ll. 2-7). The stability of Applicant's claimed "fuel for motor vehicles comprising an emulsion between water and a liquid hydrocarbon" (Currently Amended Claim1) "is not substantially jeopardized by the anti-cavitation agent" (Spec., p. 12, ll. 6-7) newly added thereto. The explanation appears to be that Applicant's anti-cavitation additive "is soluble in the emulsion . . . in concentrations ranging from 30 ppm to 3% by weight . . . with respect to the overall weight of the emulsion" (Spec., p. 12, ll. 6-11). Persons having ordinary skill in the art reasonably would have understood that the invention defined by Applicant's currently amended claims is patentably distinct from the subject matter Westfall discloses.

For the reasons stated herein, Applicant's current claims are patentable over the applied prior art teaching of Westfall and should be sent to issue.

Respectfully submitted,

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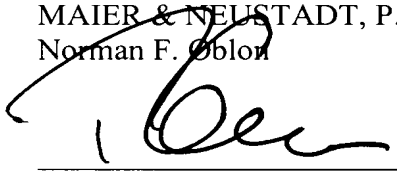

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